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SUMMARY OF OBSERVATIONS MADE IN CALIFORNIA CONCERNING  
ILLNESSES OF PERSONS LIVING, WORKING OR GOING TO SCHOOL  
ON PROPERTY NEAR A COTTON FIELD RECENTLY SPRAYED  
WITH A DEFOLIANT

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In recent years in California there have been many complaints about foul odors and several hundred instances of reported human illnesses characterized by wheezing, coughing, eye irritation, headaches and nausea in persons who have spent some time near a cotton field within 48 hours after a defoliant has been applied. Over the past six years a sizable number of these episodes have been investigated.

None of these episodes has been associated with the individual use of sodium chlorate or organic arsenic as defoliants.

The episodes have been associated with the use of DEF alone, Folex alone, DEF AND Paraquat in combination, Folex and Paraquat in combination, and Paraquat alone. The use of Paraquat alone has led to difficult breathing episodes but not to foul odor complaints. The most serious incidents have been associated with DEF or Folex, particularly DEF. This may be related to the much greater volume of sales for DEF than for Folex. The chemical constituent with the offending odor has been considered to be butyl mercaptan, which is a breakdown product of these similar pesticides.

The application of DEF near a school or residential area particularly during a period of area-wide air stagnation, has led to the most complaints. Prior to 1974 it was assumed that the butyl mercaptans present in DEF and Folex at the time of sale were the major problems. Efforts by both registrants early in 1974 were directed toward this problem.

Prior to the production of DEF and Folex for use in the 1974 and 1975 seasons, separate office hearings were held with each registrant of these products concerning the need to reduce the foul odor prior to sale. Substantial progress was made prior to the 1974 season and additional improvements were achieved for each of these products prior to the 1975 season. This was attested to by various staff members of our Department who had been studying this problem for three years and who evaluated the odors of the new DEF and Folex being poured into mix tanks preparatory to use.

Since 1975, immediately after these products are sprayed upon cotton there has usually been significantly less foul odor than was previously the case. However, after one day of sunshine on a cotton field, some foul odor is perceptible. This noticeable odor usually persists for another 24 hours, particularly if an air inversion condition exists. It has also become evident that when as much as 1,000 acres in adjacent areas are sprayed at the time with either product, there is still a marked undesirable odor for up to 48 hours. Studies have been made by the Department and the University of California, Davis on the problem.

It appears that although these products when poured from their container may now have very little foul odor, after they are sprayed upon a field, a foul odor often develops. This may persist in the area, be carried by the wind, and remain a problem longer under air inversion conditions. It is possible that some of the foul odor is generated in the field.

Tributyl phosphorotrithioate (active ingredient in DEF and Folex) is an organophosphate and as a pesticide it must be formulated and applied in such a manner that it remains where applied. It appears that the active ingredient of these products may volatilize and move from the field under some conditions. Although this chemical is a weak cholinesterase inhibitor it has other serious toxic factors and some studies have suggested that it has a delayed neurotoxic effect.

It is evident from the episodes of illness that have been reported that DEF and Folex should be made restricted materials so that permits can be issued that clearly restrict when, where and how these pesticides can be applied. Paraquat is already on the restricted material list.

Regulations and recommended restrictions on these three defoliants can be developed to solve the problems that these defoliants cause when they are applied too near where people live, work or go to school.

## Memorandum

To : Jake Mackenzie, Assistant Director  
Division of Pest Management, Environ-  
mental Protection and Worker Safety

Date: October 20, 1977

Place: Sacramento

From : Department of Food and Agriculture -Keith T. Maddy, Staff Toxicologist  
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Subject: Health Problems with Defoliant 1973 thru 1977.

Numerous complaints and reports of illness episodes in individuals and groups of people near cotton fields recently sprayed with DEF, Folex or Paraquat are reported each year. These incidents have been of concern to the State Department of Health, the county health departments, the California Association of County Health Officers, individual citizens, physicians, county agricultural commissioners and our Department.

This year additional complaints of discomfort and illness have continued. I understand from a statement made by a deputy health officer in Fresno County that a petition signed by more than 80 persons is now on its way to the State Department of Health protesting the use of cotton defoliants in a manner that makes people who live near the treated fields ill.

Voluntary restrictions of where, when, why and how defoliants are applied will not solve this health problem. We must move ahead with placing DEF and Folex on the restricted materials list and follow with a set of regulations that will better control the use of DEF, Folex and Paraquat on cotton.

*Keith T. Maddy*